

Aswinkumar Varathakumaran

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Profile

Senior undergraduate focused on computer vision, generative modeling, and multimodal AI, with research experience in real-time perception systems, foundation model adaptation, and applied deep learning for high-impact visual understanding tasks.

Education

Vellore Institute of Technology

B.Tech in Computer Science with AI/ML Specialization — **CGPA: 8.96**

2022 – Present

Chennai, India

Delhi Public School

CBSE XII — 94.4%

2021 – 2022

Bangalore, India

Teaching

Undergraduate Machine Learning TA



July 2024 – Dec 2024

PI: Dr. Sajidha S A — VIT Chennai

- Assisted final year ML students with machine learning assignments, tutorials, and guided project workflows for hands-on learning.

Publications

- Varathakumaran, A., & Paramanandham, N.** *Depth-Aware Instance Segmentation for Accurate Pothole Depth Estimation Using Monocular Depth Maps for Advanced Driver Assistance.* **International Journal of Pavement Engineering (IJPE).** (Under Review) [Code](#) [Paper](#)
- Varathakumaran, A., & Paramanandham, N.** *ProvRain: Rain-Adaptive Denoising and Vehicle Detection via MobileNet-UNet and Faster R-CNN.* **ICSINTESA 2025.** (Accepted) [Code](#) [Paper](#)
- Varathakumaran, A., Jawahara, A., Mynampati, S.A., Sajidha, & Thaseen, S.** *PROXI-NAV: Proximity-Aware Navigation with Audio-Visual Sensing Intelligence.* **FTNCT'08.** (Under Review) [Code](#) [Paper](#)
- Varathakumaran, A., Jawahar, A., & Pandiyaraju, V.** *CLAIMS: Clinical Labeling and Abnormality Inference from Multilead ECG using LLMs with Evidence Citation.* **ICACRS 2025.** (Under Review) [Code](#) [Paper](#)

Projects

Basketball Player Tracking with Court Projection



June 2025

(YOLOv11, Streamlit, Docker, FastAPI)

- Developed a complete sports analytics pipeline using YOLOv11 trained on custom DeepSportRadar court and player annotations, enabling robust multi-player tracking under dynamic lighting and motion.
- Computed homography transformations to map broadcast-view detections onto a top-down court representation, enabling zone-based heatmaps, possession analytics, and trajectory inference.
- Built a Dockerized Streamlit-FastAPI deployment supporting live video ingestion, asynchronous inference, and real-time overlay rendering with sub-80ms latency per frame.

Space Agriculture Data Portal



Feb 2025

(NASA OSDR API, LangChain, Ollama, Streamlit)

- Engineered a data exploration portal for NASA's Open Science Data Repository (OSDR), automating dataset retrieval, metadata parsing, preprocessing, and time-series visualization of microgravity plant-growth experiments.
- Integrated an LLM-powered query engine using LangChain + Ollama, enabling scientific question-answering grounded in experiment metadata, controlled vocabulary, and mission logs.
- Designed an interactive dashboard with modular visualizations (growth curves, environmental parameters, genotype comparisons) to support hypothesis formation for space agriculture research workflows.

Achievements

- Program Representative for **Computer Science AI&ML branch** at *VIT Chennai*.
- Top **10 Finalist** at *Hack The Horizon 2.0* — VIT Chennai AI Club's flagship 24-hour hackathon with **200+** participants from South India.
- Top **5 Finalist** in *Cosmonova*, a space-based research hackathon hosted by **SEDS Antariksh**.

Extracurriculars

- **Treasurer & Marketing Lead, Socrates Club - VIT** Aug 2023 – Present
Managed club finances, sponsorship acquisition, budgeting for events, directed promotional strategies, designed materials, and enhanced campus visibility.
- **Sophrosyne VIT, Toastmasters International** July 2024
Was part of the newsletter editorial team and organized public speaking workshops for 80+ participants.
- **Internshala Student Program (ISP) 2025** Mar 2025
Represented Internshala, promoting internships, trainings, and student engagement.
- **Marina Beach Cleanup** May 2024
Co-led 3 km cleanup with 15+ volunteers.
- **American Football Team — VIT Chennai** June 2023 – April 2024
Vice Captain, led a 15-member team to semi finals in a state level tournament.

Certifications

Oracle Cloud Infrastructure 2025 Generative AI Professional — Oracle University	June 2025
Neural Networks and Deep Learning — DeepLearning.AI	Aug 2025
Forge Industry Certification – Accenture Nordics — Forage	May 2024

Technical Skills

- **Languages:** Python, C/C++, Java, SQL, HTML/CSS, JavaScript
- **Frameworks:** PyTorch, TensorFlow, Streamlit, React, Next.js
- **Developer Tools:** Git, VSCode, CVAT, Roboflow, Docker
- **Libraries:** OpenCV, MediaPipe, HF Transformers, LangChain, pandas, NumPy
- **Vision Models:** YOLO, Detectron2, SAM, HRNet, MiDaS, ZoeDepth
- **Core:** Keypoints, Segmentation, Homography, Depth Estimation, Video Inference
- **NLP:** NER, Sentiment Analysis, Speech-to-Text, Text Generation
- **APIs & Data:** HF API, NASA OSDR API, REST APIs, SQLite3, MySQL